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Military Decision Making in the Information Age

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Abstract of
MILITARY DECISION MAKING
IN THE
INFORMATION AGE

Key to the success or failure of information age commanders will be their ability to adapt to the changing nature of warfare. As our military forces transition from an industrial-based force to an information-based force, three critical aspects of military decision making will be most affected by enhancements in Information Technology --- **certainty, tempo, and command and control.** In the information age, the operational commander's role will become increasingly critical to successful military operations. He must maintain a full understanding of the fluid strategic situation while ensuring that subordinate commands have a clear understanding of his intent. Though this is true today, in tomorrow's time-compressed operations, commanders may not get a second chance. As commanders will be making decisions in an increasingly compressed decision cycle, tempo will become the most critical aspect of future decision making. The operational commander will have to balance his tempo with that of the National Command Authority (NCA). He will also have less time to prepare and will have to plan along a much broader spectrum of warfare from conflict outbreak to peace resolution and operations. Consequently, commanders must practice decisions in realistic scenarios under time constraints. Finally, commanders will need to exercise and develop peacetime relationships with members of the NCA and civilian agencies to ensure preparedness for military operations.

Introduction.

The process by which warfighters assemble information, analyze it, make decisions, and direct their commands has challenged men since the beginning of warfare. As new technologies emerge, how they might best improve this process poses an even greater challenge. New or better technologies do not win wars. But an innovative combination of new technologies and tactics can, and on occasion, give an overwhelming advantage to the warfighter, termed a Revolution in Military Affairs (RMA).¹

In their seminal work, War and Anti War, Heidi and Alvin Toffler conclude that as the world's economic base transitioned from agricultural to industrial; so too did the manner in which warfare was conducted.² Now, as we transition from the industrial to informational age, termed "The Third Wave"³, they predict warfare will also change. Naturally, these changes could have a profound effect on the manner in which warfighters direct their commands. In response to the Tofflers' proposition, RMA pundits have generated reams of articles about the possible use of information technologies as a weapon. However, significant thought should be devoted to the study of the ongoing Information Revolution's impact on decision making in warfare --- the focus of this paper.

As our military forces undergo this transition from an industrial-based force to an information-based force, three critical aspects of military decision making will be most affected by enhancements in Information Technology --- **certainty, tempo, and command and control.** Key to the success or failure of information age commanders will be their ability to adapt to the changing nature of warfare. One strong proponent of the "Third Wave" and the RMA, then Army Chief of Staff General Gordon R. Sullivan predicted, "success in the information age will go to those who have the courage to challenge themselves, who constantly innovate, learn and adapt as they go."⁴ In the following pages I will offer some preliminary insights on the three above-mentioned critical aspects of military decision making.

Certainty.

Theorists and practitioners alike are excited about the possibilities of what we will know in the information age. Typical is the enthusiasm of the current Vice Chairman of the Joint Chiefs of Staff,

Think of what it would mean to have real-time surveillance of a 200-mile wide battlefield, and to be able to send a ballistic missile anywhere on that battlefield in four minutes -- a missile that goes reliably, and goes where you want it to go. That's a marvel.⁵

Similarly, to the extent that we can reduce uncertainty on the battlefield, we can improve our chances of making the best decisions possible. Again, some claim we will have near-perfect information in real time; thus, lifting or eliminating the fog of war.⁶ However, uncertainty stems from both physical characteristics of the battlespace and human elements. Even with the ability to know with certainty every enemy location, weapons capability, and situational awareness; human elements such as the enemy's intent and real-time decisions will not be known.⁷

Bill Gates has said, "we'll have infinite bandwidth in a decade's time."⁸ This together with asynchronous transfer mode (ATM) technology will make 2.4 gigahertz (billions per second) data rates possible for voice, data and video simultaneously.⁹ To some this capacity represents a frightening prospect of information overload. Not impressed by 2.4 Ghz capacities, one might envision uncharted gigabytes, several libraries worth of information, flowing through an information system with the commander's task to find key information akin to finding a needle in a haystack. But in addition to providing more information, information technology as it evolves will provide decision makers with access to several libraries of continuously updated

information -- and like a library, accessible and user friendly. More simply, we will have information on demand.

To build effective decision support systems that make information on demand possible, software engineers and artificial intelligence experts must rely on the decision maker's ability to identify essential elements of information. This, then, will be the challenge to the commander in the information age --- to ask the right questions because the answer will be available. Similarly, those who build decision support models will be challenged to present information in a usable format for the commander.

Even if we have near perfect information and it is accessible on demand, we must ensure the integrity of the information that we have in order to be effective. The information technology that makes the Information Revolution possible is available globally and is evolving in the commercial sector. As a result, we must seriously consider the potential of an enemy's capability to devastate the commander's ability to make coherent decisions by exercising Information Warfare techniques. An overreliance on information technology will make us most susceptible to an opportunist's Information Warfare techniques,¹⁰ potentially stripping us of needed information or manipulating information as part of a deception plan.

Therefore, effective security measures are essential to guaranteeing and maintaining information integrity for the commander. The information warriors that might be deployed as decisive offensive tools of war must also be considered for use as defensive security measures for our own information systems. Information warriors can detect and repair enemy information warfare strikes and conduct "counter-info strikes" to destroy enemy strike origins.¹¹

In short, information will only be of value to the commander insofar as it is relevant, usable and reliable. The commander's ability to make coherent decisions will be enhanced when key elements of information are available in real time and are authentic.

Tempo.

Information technology with its increased speed of communications will impact the information-age warrior's decision-making process in several significant ways. Many herald the speed at which we can process information as an enabler that allows us to decide and act within the enemy's decision cycle, the "OODA loop"(observe, orient, decide, and act). This in turn ensures victory because the enemy is overcome by events.¹²

However, not much attention has been given to the possibility that we may prosecute the war at such a pace

that we will be inside of our own decision cycle. The Gulf War serves as an example of our ability to observe, orient, decide, and act at the tactical level at a speed that outpaced our ability to react and make decisions at the operational and strategic levels of war. Today, five years after the end of the ground campaign, journalists and writers continue to second guess President Bush's decision to end the ground campaign. Much has been written on the efficacy of that decision. Yet, in light of the rapidity with which the ground campaign progressed, exceeding everyone's expectations, perhaps the National Command Authority (NCA) simply was not prepared to fully consider a decision to cease operations.

Commanders in the information age will need to harness the ability to increase the tempo by balancing the capability to remain inside the enemy's decision cycle, while ensuring that we don't outpace our own. Consequently, the operational commander will become the linchpin of successfully managing the tempo of war to achieve this balance. He is both focused on the tactical situation as it evolves and situated to know what is happening at the strategic level.

Theoretically, information technology should leave more time to think and less time spent on "stubby pencil work". But commanders don't do stubby pencil work; staffs do.

Information technology together with weapons innovations have significantly increased the tempo of warfare compressing the time between a commander's decision and its implementation. However, the increase in tempo has also compressed the time between the consequences of one decision and the need to make the next decision leaving less time for commanders at all levels of command to think.

Exasperating the significant decrease in time to think is an increase in the complexity of warfare. This places an even greater emphasis on formal decision-making processes and templates which only slow the rate at which decisions can be made by lengthening the decision-making process. To some extent automation may alleviate the need to make some decisions, but commanders and staffs will have to learn to make decisions in real time within the context of a rapidly changing battlespace environment. The only way to achieve this competency is continued realistic training in our training centers and improving realism in our formal military schools which tend to emphasize laborious deliberate planning processes and decision matrices. These tools are undoubtedly important to the preplanning phases of campaigns. Indeed, more thought in the deliberate process will contribute to the commander's ability to adapt as the situation unfolds. However, training scenarios need to step beyond the planning phases to the execution phases of

operations to stress the commander's decision-making skills in a time-compressed environment.

In sum, in the face of less time to react and think, the commander must develop operating procedures that distinguish between which decisions he must make, which decisions can be automated, and which decisions will necessarily be made at lower levels of command. This leads us to the third critical element impacted by information technology on decision making and that is command and control.

Command and Control.

Command and Control (C2) issues in the Information Age as they pertain to decision making span a wide range. From an organizational perspective, C2 raises the question of who the decision maker will be and at what level decisions will be made. With respect to decision implementation, whether or not unity of effort can be maintained in an age where several different actors simultaneously have both the information and the power to act is of concern. Two keys to success will be 1) clearly defined goals communicated to all levels of command to ensure unity of effort and 2) flexible, adaptive commanders.

Another emerging C2 issue for the military is the need to flatten hierarchies. As a direct result of the information age, flattening hierarchies is well-known within the commercial sector. Organizations delay by eliminating those elements that simply filter and relay information as a means of realizing savings to pay for expensive information technologies. Middle management levels that do not add value to the information presented are cut. In warfare, military hierarchies must eliminate layers that simply filter information¹³ to ensure timely implementation of commanders' decisions and at the same time to ensure information needed at each command level is not slowed.

In addition to flattening hierarchies as a more efficient means of capitalizing on information technologies, there is also a great deal of emphasis on C2 decentralization, requiring commanders and soldiers to exercise more initiative at lower levels of command. In this environment, key to success in maintaining coherent decisions that achieve the desired end state will be a clear commander's intent disseminated in real time to all levels of command. This real-time dissemination may be accomplished through distributed imagery communications as opposed to the more traditional voice and text transmissions.¹⁴

A civil sector example of a move to decentralized decision making as a result of information technology is found in the air traffic control arena. A new concept called "free flight" will transfer flight path selection decisions from air traffic controllers to pilots. Free flight will allow pilots a high degree of flexibility in stark contrast with current highly restrictive procedures. As a result, decisions and responsibility for air traffic control operations, currently restricted and controlled by air traffic controllers, will be shared between pilot and controller.¹⁵

Though technologically feasible and expected to result in significant efficiencies in time and money, free flight faces "cultural" obstacles. According to Bruce D. Nordwall in a special report to Aviation Week & Space Technology, "The problems standing in the way of free flight are largely geopolitical and organizational rather than technical."¹⁶ The air traffic control community is proceeding, nonetheless, to implement organizational and procedural changes to realize the benefits offered by free flight.

This example has particular significance for the military. As we transition to the information age, how will our organizations and procedures change to adapt optimally? In the Army, we find a series of fully-equipped Experimental Forces (EXFOR), ranging in size from a brigade (Phase I) to

division (Phase II) to ultimately a simulated corps (Phase III). Training and learning over this three-phase program, the Army intends to explore how to fight, organize, and command in the information age. In the words of the effort's proponent, "The ultimate result will be a fully digitized Army prepared to exploit information age technology ..."¹⁷

If information is available to several levels of command simultaneously, the question then becomes 1) who will be the decision maker and 2) who will act. At the tactical level the answer is best demonstrated by the sensor-to-shooter situation where the individual soldier will be able to observe, orient, decide, and act in real time. This translates into exciting increases in battle tempo and a capability to seize and maintain initiative. At the operational and strategic levels, however, where strategic and political objectives are increasingly complex and fluid, the impact of information technologies is far less clear.

The opposite concern of decentralized C2 is that the NCA will, as a result of information technologies, have the capability and desire to micromanage the war. As a direct result of The 1986 Goldwater-Nichols Act, more control has been shifted to the unified CINC away from the National Command Authority (NCA). This represents a shift away from

the Vietnam era where frequently the White House controlled the prosecution of the War down to target identification at the tactical level. However, in an information age where the NCA is held accountable for tactical actions by a public media in real time, the NCA may be compelled to become more involved as the situation develops. As a practical matter, it is not enough to say that limiting the NCA and the unified CINCs to their respective roles will solve this dilemma because these roles were delineated in a Cold War era.

Moreover, in the post-Cold War era, the operational commander can expect to interface with a NCA that is making decisions as a part of an ad hoc coalition.¹⁸ This further encumbers the decision-making process at the strategic level and raises once again the question of whether or not we can prosecute a war without getting inside our own decision cycle.

It would be easy to prescribe a solution by requiring carefully delineated areas of responsibility (to alleviate this problem). But in reality, what we have seen is an increasingly global situational awareness for the UN, NATO, and the NCA. This results in a fluid political situation complicated by international relationships, cultural values and divergent goals. While real-time situational awareness provides the potential for increased tempo at the

operational level of war and below, global situational awareness increases the potential number of participants in the strategic decision making process, leading to a decreased "tempo" above the operational level.

This presents an increasingly complicated challenge for the operational commander who must maintain command and control of the military forces in theater while simultaneously maintaining situational awareness of changes at the strategic level. Just as a clearly communicated commander's intent solidifies unity of effort in the echelons below his level, a clearly defined strategic end state secures unity of purpose between the operational and strategic command levels. This places a premium on the operational commander having a thorough understanding of the military's role as an instrument of foreign policy.

As in the preceding section on tempo, commanders can ameliorate the difficulties of these complexities by training in peacetime. Because decisions will impact a much broader spectrum of warfare, training and education in all levels of warfare are essential. Human judgments and decisions can be rehearsed, practiced, and gamed in peacetime. In addition to realistic training in peacetime for commanders and staffs at the operational and strategic levels, this training must include members of the NCA and civilian agencies that participate in wartime operations.

There will always be contingencies we fail to predict. However, operational commanders must be practiced in interfacing with the NCA and civilian agencies under realistic time constraints so we can count on them to be prepared in wartime decision making situations.

Some preliminary conclusions.

Due to the ongoing nature of the information revolution, one can only offer preliminary conclusions. In the information age, the operational commander's role will become increasingly critical to successful military operations. He must maintain a full understanding of the fluid strategic situation while ensuring that subordinate commands have a clear understanding of his intent. This intent must be clearly stated, yet leave necessary flexibility for subordinate commanders to react to and adapt to an increasingly fluid battlespace. Though this is true today, in tomorrow's time-compressed operations, commanders may not get a second chance. As commanders will be making decisions in an increasingly compressed decision cycle, tempo will become the most critical aspect of future decision making. The operational commander will have to balance his tempo with that of the National Command Authority (NCA). He will also have less time to prepare and will have to plan along a much broader spectrum of warfare

from conflict outbreak to peace resolution and operations. Consequently, commanders must practice decisions in realistic scenarios under time constraints. Finally, commanders will need to exercise and develop peacetime relationships with members of the NCA and civilian agencies to ensure preparedness for military operations.

In sum, information technology has enormous potential to impact decision making in warfare. Enhancements in information technologies will result in better and more information for commanders at all levels. However, the operational commander will need to make decisions in shorter amounts of time and must recognize that those decisions may have a much broader strategic impact.

NOTES

1. Andrew Marshall, Statement, U. S. Congress, Senate, Committee on Armed Services, Subcommittee on Acquisition and Technology, Revolution in Military Affairs, Hearing, 5 May 1995.

2. Alvin and Heidi Toffler, War and Anti-War: Survival at the Dawn of the 21st Century (Boston: Little, Brown, 1993), 3.

3. Alvin Toffler, The Third Wave (New York: Morrow, 1980), 26

4. Gordon R. Sullivan and John M. Dubik, "War in the Information Age," Military Review, April 1994, 61.

5. William A. Owens quoted in John Barry, "The Battle Over Warfare," Newsweek, 5 December 1994, 27.

6. William A. Owens in speeches frequently explained that global intelligence systems combined with enhancements in C4I would lift the fog of war, creating dominant battlespace awareness. To illustrate, he proposed the analogy of a game of chess with an opponent where for the first time in history we would be able to see both sides of the chess board.

7. Kenneth F. McKenzie, Jr., "Beyond the Luddities and Magicians: Examining the MTR," Parameters, Summer 1995, 17.

8. Bill Gates quoted in George Gilder, "Telecosm: The Bandwidth Tidal Wave," Forbes ASAP, 5 December 1994, 163.

9. George Gilder, "Telecosm: The Bandwidth Tidal Wave," Forbes ASAP, 5 December 1994, 170.

10. Bruce D. Berkowitz, "Warfare in the Information Age," Issues in Science and Technology, Fall 1995, 62.

11. James P. McCarthy, "The Information Revolution and Its Impact on the U. S. Air Force," Unpublished Speech, Air Force Association Fifth Annual Air Force Acquisition Update, Colorado Springs, CO, 26 May 1995, .

12. FMFM 1, Warfighting (Washington, D.C: Department of the Navy, 6 March 1989), p.84

13. Alan D. Campen, "Rush to Information-Based Warfare Gambles with National Security." Signal, July 1995, 67-69.

14. Thomas J. Czerwinski, "Command and Control at the Crossroads," Marine Corps Gazette, October 1995, 15.

15. Bruce D. Nordwall, "Free Flight: ATC Model for the Next 50 Years." Aviation Week & Space Technology, 31 July 1995, 38.

16. Bruce D. Nordwall, "'Cultural' Shift Key to New Concept," Aviation Week & Space Technology, 31 July 1995, 40.

17. U. S. Army Office of the Chief of Staff, Force XXI ... America's Army of the 21st Century (Department of the Army, Louisiana Maneuvers Task Force, Fort Monroe, Virginia, 15 January 1995), 29.

18. National Defense University, Institute for National Strategic Studies, Strategic Assessment 1995: US Security Challenges in Transition (Washington, D.C: 1995), 13.

BIBLIOGRAPHY

- Barry, John. "The Battle Over Warfare." Newsweek, 5 December 1994, 27-28.
- Berkowitz, Bruce D. "Warfare in the Information Age." Issues in Science and Technology, Fall 1995, 59-66.
- Campen, Alan D. "Rush to Information-Based Warfare Gambles with National Security." Signal, July 1995, 67-69.
- Clemen, Robert T. Making Hard Decisions. Boston: PWS-Kent, 1991.
- Czerwinski, Thomas J. "Command and Control at the Crossroads." Marine Corps Gazette, October 1995, 13-15.
- FitzSimonds, James R. "The Coming Military Revolution: Opportunities and Risks." Parameters, Summer 1995, 30 -36.
- FMFM 1. Warfighting. Washington, D.C: Department of the Navy, 6 March 1989.
- Gilder, George. "Telecosm: The Bandwidth Tidal Wave." Forbes ASAP, 5 December 1994, 163-177.
- McCarthy, James P. "The Information Revolution and Its Impact on the U. S. Air Force." Speech. Air Force Association Fifth Annual Air Force Acquisition Update. Colorado Springs, CO, 26 May 1995.
- McKenzie, Jr., Kenneth F. "Beyond the Luddities and Magicians: Examining the MTR." Parameters, Summer 1995, 15-21.
- National Defense University. Institute for National Strategic Studies. Strategic Assessment 1995: US Security Challenges in Transition. Washington, D.C: 1995.
- Nordwall, Bruce D. "Free Flight: ATC Model for the Next 50 Years." Aviation Week & Space Technology, 31 July 1995, 38-39.
- _____. "'Cultural' Shift Key to New Concept." Aviation Week & Space Technology, 31 July 1995, 40-42.

Owens, William A. "The Emerging System of Systems."
Proceedings, May 1995, 35-39.

Sullivan, Gordon R. and John M. Dubik. "War in the
Information Age." Military Review, April 1994, 46-62.

Toffler, Alvin. The Third Wave. New York: Morrow, 1980.

Toffler, Alvin and Heidi. War and Anti-War: Survival at the
Dawn of the 21st Century. Boston: Little, Brown, 1993.

TRADOC Pamphlet 525-5. Force XXI Operations: A Concept for
the Evolution of Full- Dimensional Operations for the
Strategic Army of the Early Twenty-First Century.
Department of the Army, Headquarters US Army Training
and Doctrine Command, Fort Monroe, Virginia,
1 August 1994.

U. S. Army Office of the Chief of Staff. Force XXI ...
America's Army of the 21st Century. Department of the
Army, Louisiana Maneuvers Task Force, Fort Monroe,
Virginia, 15 January 1995.

U. S. Congress. Senate. Committee on Armed Services.
Subcommittee on Acquisition and Technology.
Revolution in Military Affairs. Hearing. May 5, 1995.